Technological Stewardship for Engineers

Organized by University of Manitoba IEEE and Engineering Change Lab (ECL)

Your UMIEEE Workshop Presenters

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Topics to be Covered (Agenda)

General learning outcome: Understand that technology impacts society and that, we, as engineers, need to consider those impacts during the design process.

More specifically, you should specifically learn:

- How to describe the relationship between engineering and society
- How to describe and contrast the impacts of existing technologies on society
- How to define technological stewardship

Approximated length: 60-70 minutes. Extra 20 minutes at end for questions.

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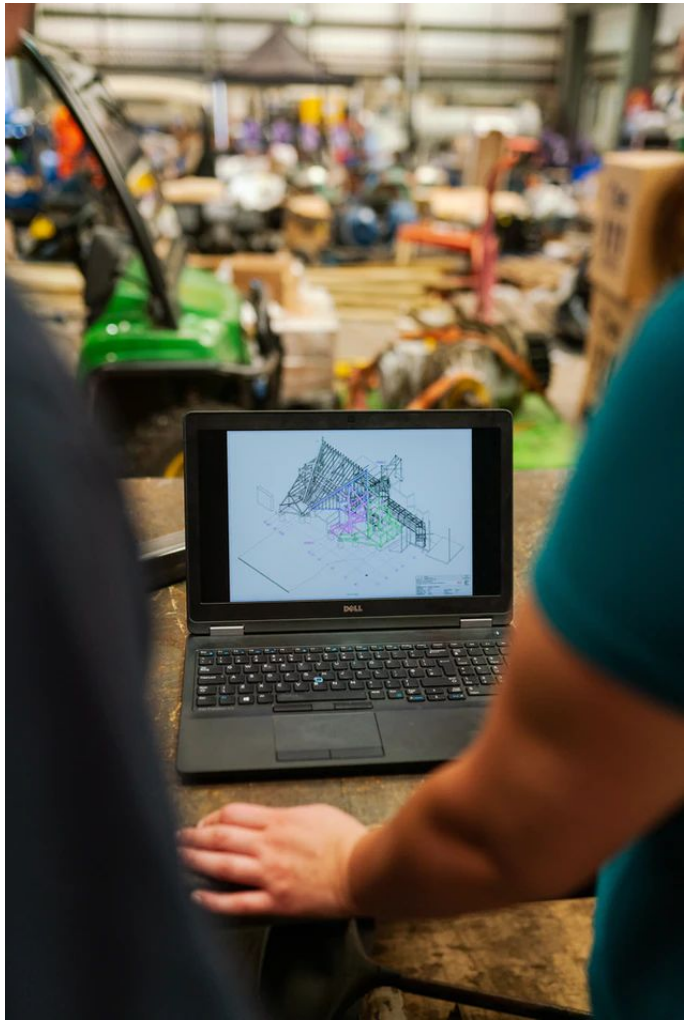
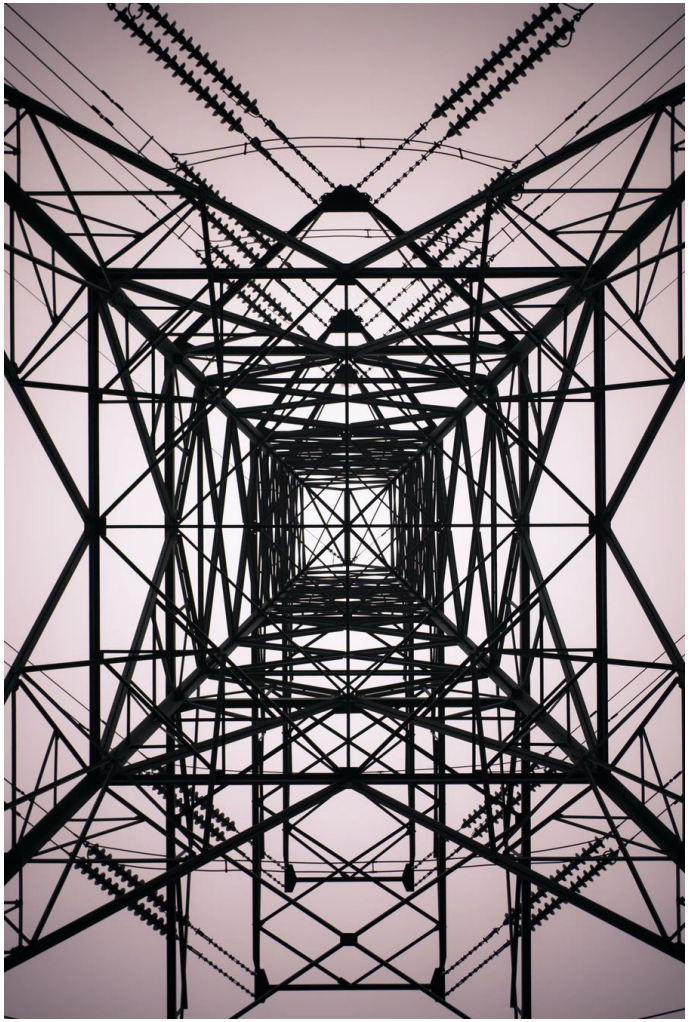
How many of you chose engineering to make the world a better place?



Opinion: What is the most used technology today?



Defining Technology

- Application of scientific knowledge for practical purposes
- Means by which humans adapt/alter their environment to meet their needs
- Terminology of an art, science, etc.; technical nomenclature

Not necessarily just a phone, but anything used to accomplish a means to an end.

- Transportation highways
- Weapons
- Cooking (spoon, fork, chopsticks, fire, boiling)
- Books

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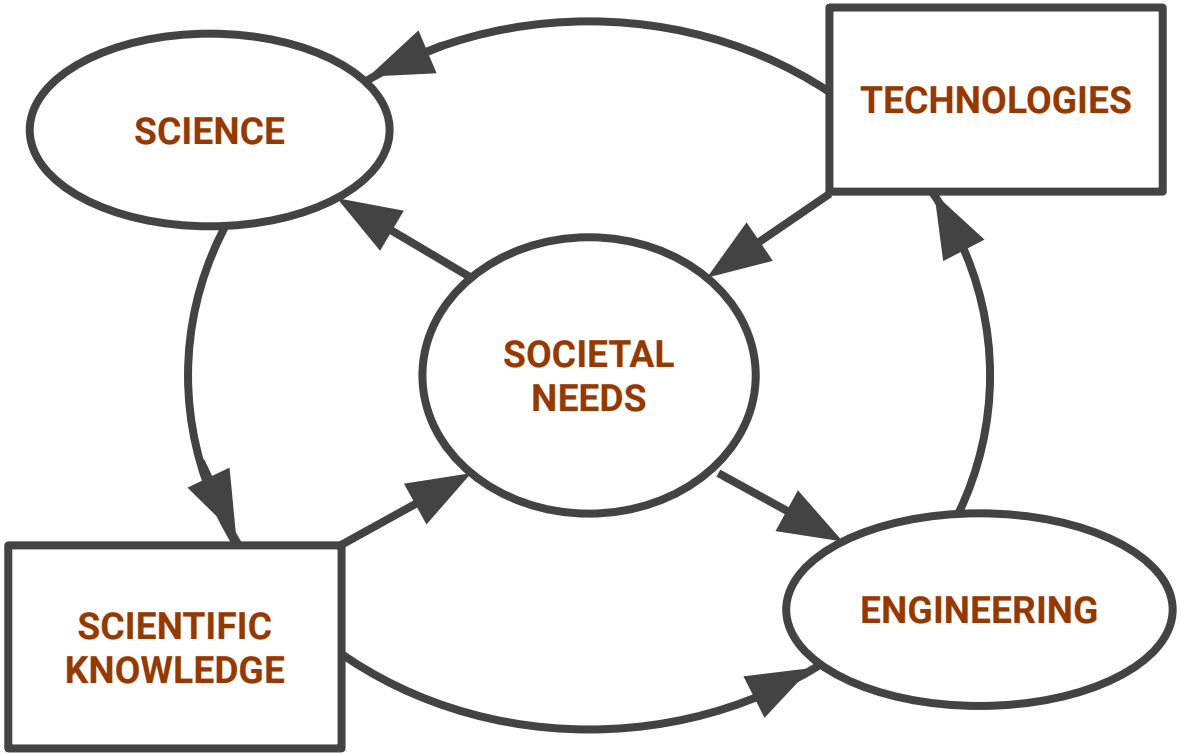

Adapted from Museum of Science, Boston
Visualization by Engineering Change Lab

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Impacts of Technology

Examples of world-changing technologies:

- Batteries
- Radio communications
- Transistors
- Printed Circuit Boards (PCBs)

Scales of impact on:

- You, your immediate household
- Local society
- Global society

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List Most Significant Impacts of Automobiles

POSITIVE IMPACTS

NEGATIVE IMPACTS

Graphics from Engineering Change Lab

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New technologies bring about **paradigm shifts** in society

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Defining Paradigm

- Idea or model about how functions/operates
  - Often left unstated — obvious to people who share it
- Widely accepted example, belief, or concept

Examples:

- Evolution
- Round earth
- Newtonian mechanics (at macro scales)
- RFC 2616 (Hypertext Transfer Protocol or HTTP/1.1)
- Ubiquitous computing

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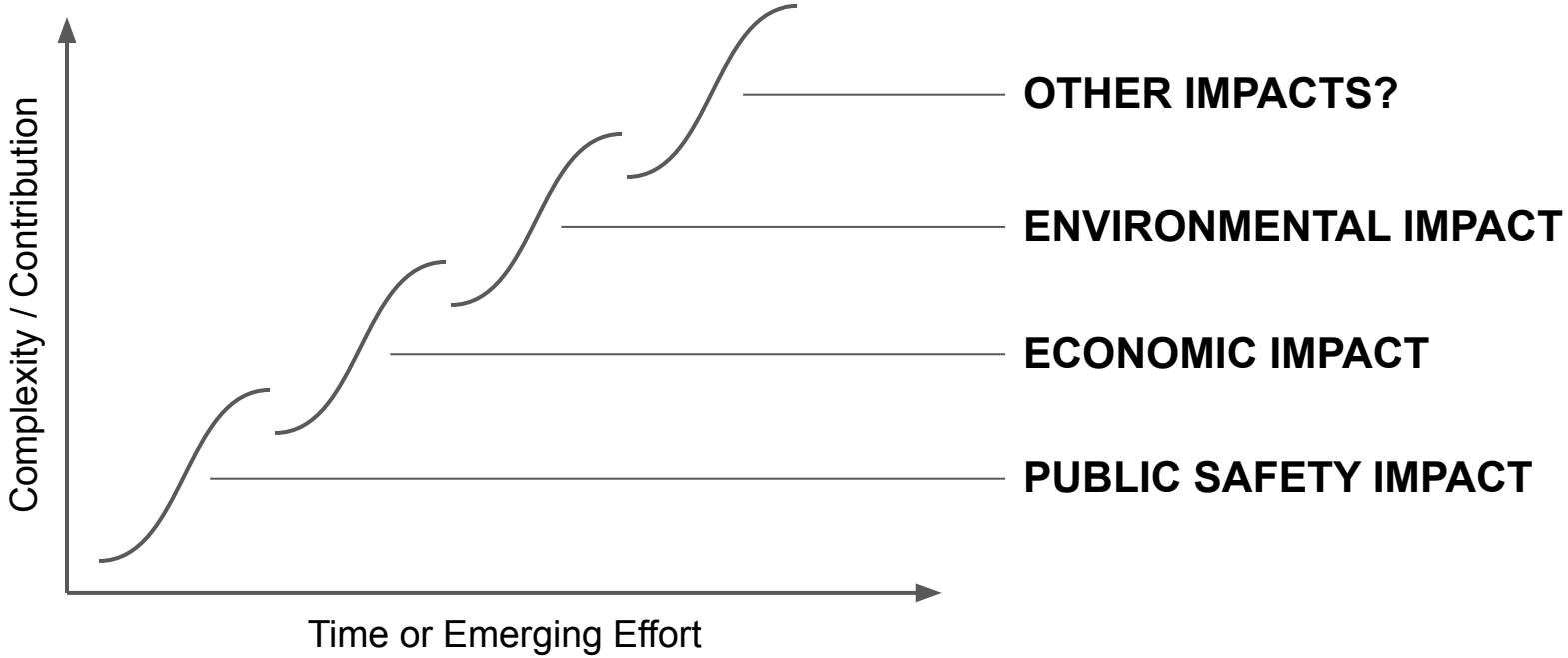
Engineering Paradigm Shifts



Graphics adapted from Engineering Change Lab

Technological Stewardship

- Newest paradigm shift in engineering
- Behaviour ensuring technology is employed to make word a better place
    - More equitable, inclusive, just, and sustainable

Examples include face recognition technology.

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Creators, influencers, and engineers of new technology **need to step up** to greater responsibilities

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Embracing Greater Responsibility

- How contributions are seen by engineers and general public alike
- Participants in evolving technology
- Perspective considerations during development/evolution of technology

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HOW?

that is the question

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Principles-Based Approach

- Different from rules of engagement
  - Stop sign vs. defensive driving
- Different from recipes
  - Add ½ teaspoon of salt vs. season to taste

Ultimately, depends on your principles and ethics.

- Not only for large projects, but everyday engineering activities
  - School work, capstone, design projects, co-operative education (co-op) opportunities

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Technological Stewardship Principles

- **S**eek purpose
- **T**ake responsibility
- **E**xpand involvement
- **W**iden approaches
- **A**dvance understanding
- **R**ealize diversity
- **D**eliberate values
- **S**eek regeneration

Remember **STEWARDS** acronym.

- Choose and reflect upon each different principle
  - Why do you think this principle is important?
  - How does this principle contribute toward making a better world for all?
- For an extra challenge, apply the principles to a specific technology
  - Give example of how certain technologies support or fail certain principles

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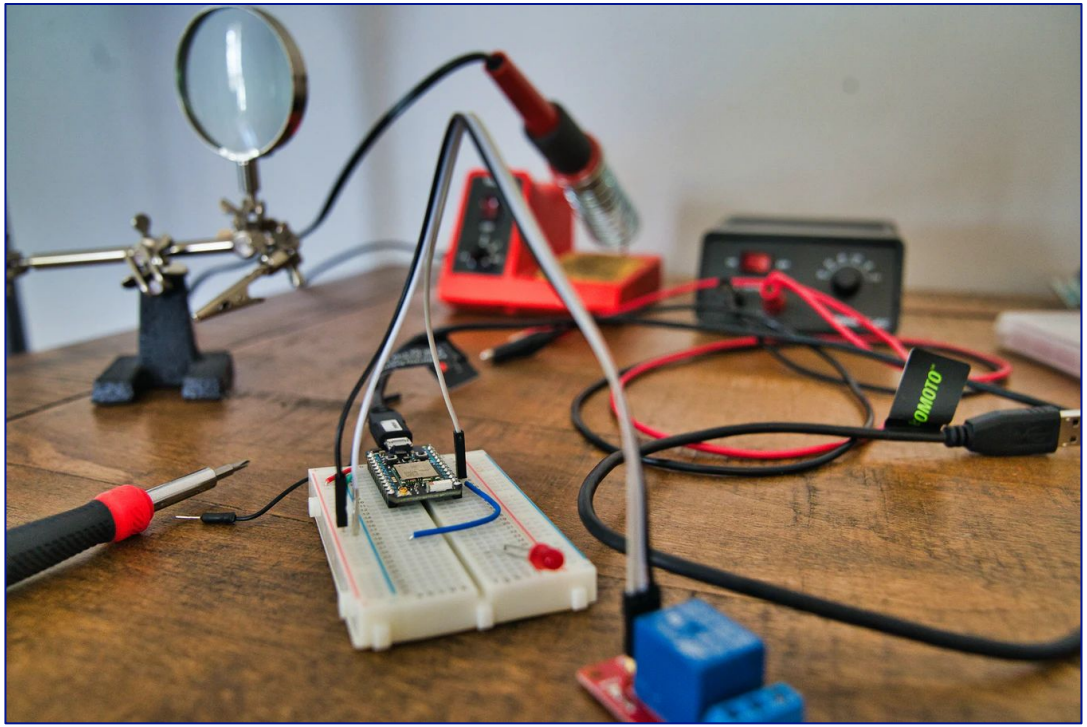
To recap…



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Word From Engineering Change Lab

Davyani Vasta

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Engage with Engineering Change Lab (ECL)

- Contact Davyani: eclc@cfes.ca
- Check out the ECL website: engineeringchangelab.ca/
- Subscribe to the ECL newsletter: engineeringchangelab.ca/subscribe/
- Sharing with friends on social media (LinkedIn)

Closing Remarks

Consider joining UMIEEE!

edu.ieee.org/ca-umieee/about-ieee/join-ieee-2/

Questions?

Thanks for attending our workshop!

We will now take any additional remaining questions! (Please place in the chat.)

If you have more questions, join UMIEEE.